

10 / 542994

20 JUL 2005

1250714

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

November 18, 2004

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 60/529,445

FILING DATE: *December 12, 2003*

RELATED PCT APPLICATION NUMBER: *PCT/US04/33627*

Certified by



Jon W Dudas

Acting Under Secretary of Commerce
for Intellectual Property
and Acting Director of the U.S.
Patent and Trademark Office





22764 U.S. PTO

PTO/SB/16 (08-03)

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Approved for use through 07/31/2006. OMB 0851-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EL 974386728 US

| INVENTOR(S) | | | | | |
|---|--|------------------------|--|---|--|
| Given Name (first and middle (if any)) | | Family Name or Surname | | Residence (City and either State or Foreign Country) | |
| Matthew M. Jason W. | | DeAngelis Osborn | | Bedford, NH Amherst, NH | |
| Additional inventors are being named on the _____ separately numbered sheets attached hereto | | | | | |
| TITLE OF THE INVENTION (500 characters max) | | | | | |
| Method Of Manufacturing Acoustic Projectors | | | | | |
| Direct all correspondence to: CORRESPONDENCE ADDRESS | | | | | |
| <input checked="" type="checkbox"/> Customer Number: 22500 | | | | | |
| OR | | | | | |
| <input type="checkbox"/> Firm or Individual Name | | | | | |
| Address | | | | | |
| Address | | | | | |
| City | | | | | |
| Country | | | | | |
| State | | | | | |
| Zip | | | | | |
| Telephone | | | | | |
| Fax | | | | | |
| ENCLOSED APPLICATION PARTS (check all that apply) | | | | | |
| <input checked="" type="checkbox"/> Specification Number of Pages 6 | | | | | |
| <input type="checkbox"/> CD(s), Number _____ | | | | | |
| <input checked="" type="checkbox"/> Drawing(s) Number of Sheets 2 | | | | | |
| <input type="checkbox"/> Other (specify) _____ | | | | | |
| <input type="checkbox"/> Application Date Sheet. See 37 CFR 1.76 | | | | | |
| METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT | | | | | |
| <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. | | | | | |
| <input type="checkbox"/> A check or money order is enclosed to cover the filing fees. | | | | | |
| <input checked="" type="checkbox"/> The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 190130 | | | | | |
| <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. | | | | | |
| FILING FEE Amount (\$) 160.00 | | | | | |
| The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government. | | | | | |
| <input checked="" type="checkbox"/> No. | | | | | |
| <input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____ | | | | | |

15535 U.S. PTO
60/529445

121203

Respectfully submitted,

[Page 1 of 2]

Date 12/12/03

SIGNATURE

Daniel J. Long

REGISTRATION NO. 29,404

(if appropriate)

Docket Number: 20030096 PRO

TYPED or PRINTED NAME Daniel J. Long

TELEPHONE 603-885-2643

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

EXPRESS MAIL CERTIFICATE EL 974386728 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: DEANGELIS, et al.

Filed: Herein

Dkt. No: 20030096 PRO

For: Method Of Manufacturing Acoustic Projectors

CERTIFICATE OF MAILING 37 CFR 1.10: I certify that this correspondence is being deposited on the below date with the U.S. Postal Service with sufficient postage as EXPRESS MAIL TO ADDRESSEE addressed to: US Patent and Trademark Office, 2011 South Clark Place, Customer Window, Mail Stop Provisional Application, Crystal Plaza Two, Lobby, Room 1B03, Arlington, VA 22202

Date:

12-12-03

Gloria Abbasciano

Gloria Abbasciano

Dear Honorable Commissioner:

LETTER OF TRANSMITTAL

Submitted herewith is a Provisional Patent Application consisting of 1 pages of cover sheet, 6 pages of specification and claims, 2 sheets of drawings.

DEPOSIT ACCOUNT 190130 AUTHORIZATION - The Office is hereby authorized to charge the required fee, and any deficiency or credit any overpayment in the fees to the above deposit account, owned by BAE SYSTEMS Information and Electronic Systems Integration Inc.

Respectfully submitted,

Daniel J. Long

Daniel J. Long, Reg. No. 29,404

USPTO Cus. No. 22500
BAE Systems
PO Box 868, NHQ01-719
Nashua, NH 03061-0868
Tel 603.885.2643
Fax 603.885.2167

METHOD OF MANUFACTURING ACOUSTIC PROJECTORS

Background of the Invention

1. Field of the Invention

The present invention relates to underwater acoustics and more particularly to underwater acoustic projectors.

2. Brief Description of Prior Developments

In low frequency underwater acoustic projectors, a segmented assembly is used to ease piece part manufactureability, assembly and handling procedures. However this assembly procedure can result in acoustic segment interactions due to a longitudinal vibration mode and/or interaction due to water loading differences along the length of the projector. Segment interactions can disrupt and distort the acoustic transmissions, they also can result in significant mechanical damage to the projector assembly.

The length of the driver and shell segment were usually limited by the length of the drive material that could be manufactured at a reasonable cost. This method of construction is more susceptible to segment interactions when there are many shell segments, (3 or more). Such factors also limit flexibility in determining the number of segments per a given projector length.

Summary of Invention

To solve this problem the acoustic projector can be assembled in a "super segment" method with multiple drivers as part of a shell segment. This not only stiffens the longitudinal assembly but also reduces the number of segments for interactions to

occur. The goal is to reduce the number of segments to 2 segments. If this is not possible then an even number of segments is needed. This solution solves interactions in the slotted cylinder projector, however this technique can be used in other transducer technologies.

The most significant advantage to the new constructions method is, multiple drivers in one shell segment stiffens the shell segments in the length direction and reduced longitudinal vibrations modes as well as significantly reduces acoustic segment interactions, usually caused by hydrodynamic load variations along the length. The new method is also not constrained by the manufacturable length of the drive material. The shell segment can be any length and multiple drivers can be assembled inside one shell segment. Additionally, this method is more cost effective and faster to assemble due to the reduced number of parts and pieces that need to be purchased or handled. Also the designer can use this construction method to ensure that the projector is designed with one or two shell segments, which is the optimum segment number(s) to eliminate segment interactions. If one or two segments can't be used then the designer has the flexibility to ensure an even number of shell segments can be used and any interactions can be managed via wiring, tuning, or shading methods.

Brief Description of the Drawings

The present invention is further described with reference to the accompanying drawings wherein:

Figure 1 is a perspective view of two multi-driver shell segments used in a preferred embodiment of the method of the present invention;

Figure 2 is a perspective view of a single multi-driver shell segment used in a preferred embodiment of the method of the present invention;

Figure 3 is a longitudinal cross sectional view of the assembled multi-driver shell segments shown in Figures 1 and 2; and

Figure 4 is a $\frac{1}{4}$ symmetry model of the prior art of one driver with one shell segment.

Detailed Description of the Preferred Embodiment

The most significant advantage to the new constructions method is, multiple drivers in one shell segment stiffens the shell segments in the length direction and reduced longitudinal vibrations modes as well as significantly reduces acoustic segment interactions, usually caused by hydrodynamic load variations along the length. The new method is also not constrained by the manufacturable length of the drive material. The shell segment can be any length and multiple drivers can be assembled inside one shell segment. Additionally, this method is more cost effective and faster to assemble due to the reduced number of parts and pieces that need to be purchased or handled. Also the designer can use this construction method to ensure that the projector is designed with one or two shell segments, which is the optimum segment number(s) to eliminate segment interactions. If one or two segments can't be used then the designer has the flexibility to ensure an even number of shell segments can be used and any interactions can be managed via wiring, tuning, or shading methods.

The single shell of the multiple driver shell segment forces the drivers to move more closely in unison than if the segments were one shell per driver. Another prior art

was to bond, pin, or epoxy single drive/shell segments as to approximate the large single shell with multiple drivers. This method has been used but has several inherent flaws.

The epoxy/pinning mechanisms used are never as strong as a single shell. Combined with the tremendous forces that are exerted during drive and interaction, failure is almost assured. However the single shell multiple drivers reduces the interaction and thus reduces the shear forces. Also the single shell is significantly strong in the shear direction to handle any interaction forces that occur. This the reduction of the segment interaction and longitudinal vibration modes the acoustic projector produces a significantly larger dynamic range. The virtually eliminated segment interaction and longitudinal vibrations also reduces the dynamic stress on the projector and thus allows the projector to operate at a deeper depth.

Figure 4 is a $\frac{1}{4}$ symmetry model of the prior art of one driver with one shell segment.

While the present invention has been described in connection with the preferred embodiments of the various figures, it is to be understood that other similar embodiments may be used or modifications and additions may be made to the described embodiment for performing the same function of the present invention without deviating therefrom. Therefore, the present invention should not be limited to any single embodiment, but rather construed in breadth and scope in accordance with the recitation of the appended claims.

Claims

What is claimed is:

1. A method for manufacturing an underwater acoustic projector comprising a plurality of cyndrical shell segment s having a longitudinal slot wherein the improvement comprises the step of using multiple drivers in at least one of said shell segments.

Abstract

A method for manufacturing an underwater acoustic projector comprising a plurality of cylindrical shell segments having a longitudinal slot wherein the improvement comprises the step of using multiple drivers in at least one of said shell segments.

Drawings

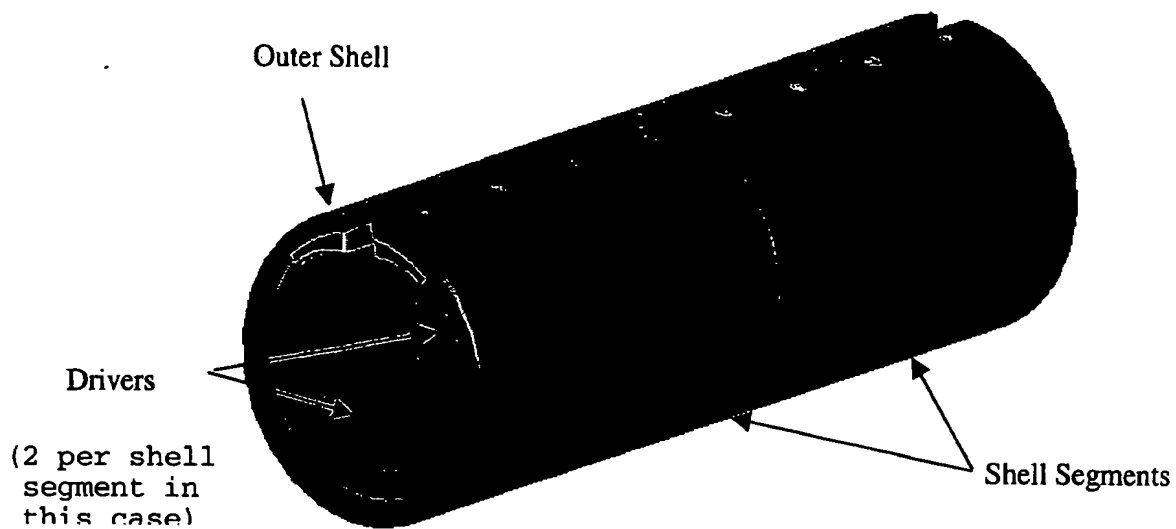


Figure 1

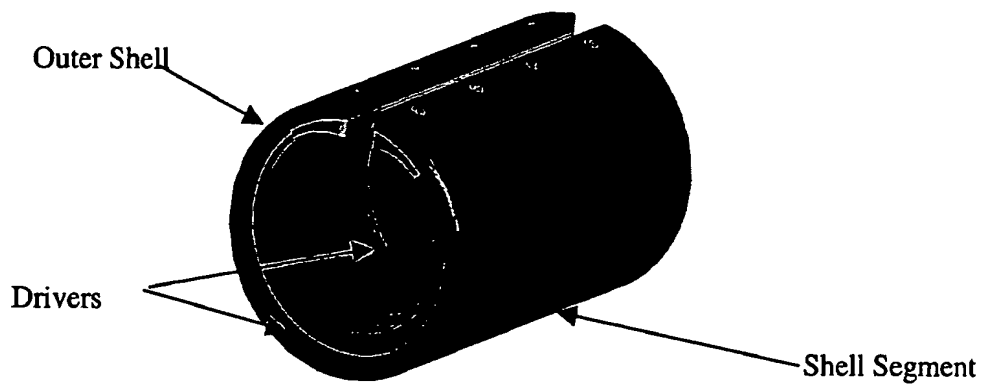


Figure 2

BEST AVAILABLE COPY

BEST AVAILABLE COPY

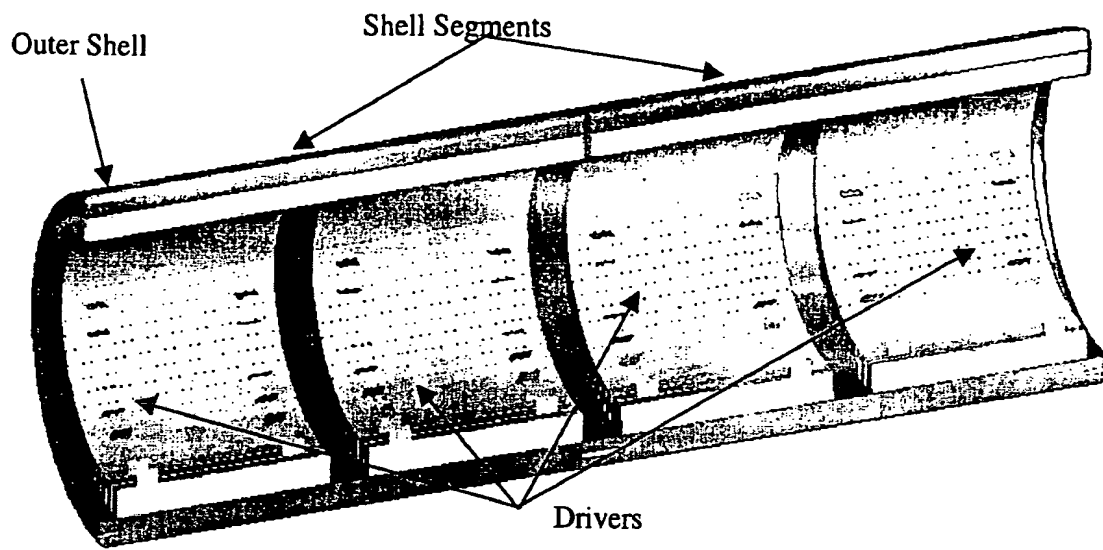


Figure 3

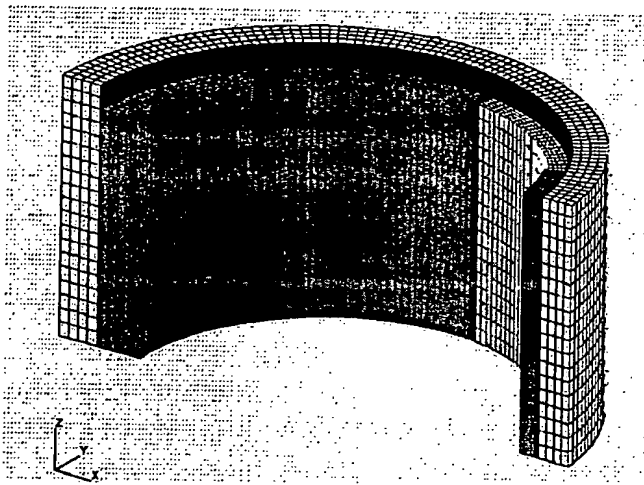


Figure 4

BEST AVAILABLE COPY

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/US04/033627

International filing date: 12 October 2004 (12.10.2004)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/529,445
Filing date: 12 December 2003 (12.12.2003)

Date of receipt at the International Bureau: 24 November 2004 (24.11.2004)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse